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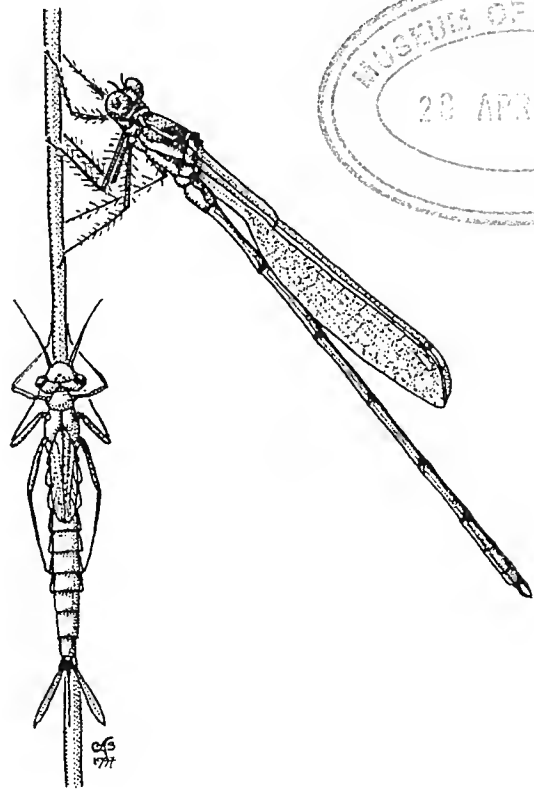

News Bulletin of The Entomological Society of Victoria Inc.

THE ENTOMOLOGICAL SOCIETY OF VICTORIA (Inc)

MEMBERSHIP

Any person with an interest in entomology shall be eligible for Ordinary membership. Members of the Society include professional, amateur and student entomologists, all of whom receive the Society's News Bulletin, the Victorian Entomologist.

OBJECTIVES

The aims of the Society are:

(a) to stimulate the scientific study and discussion of all aspects of entomology,
(b) to gather, disseminate and record knowledge of all identifiable Australian insect species,
(c) to compile a comprehensive list of all Victorian insect species,
(d) to bring together in a congenial but scientific atmosphere all persons interested in entomology.

MEETINGS

The Society's meetings are held at room AG17, La Trobe University Carlton Campus, 625 Swanston Street, Carlton, Melway reference Map 2B E10 at 8 p.m. on the third Friday of even months, with the possible exception of the December meeting which may be held earlier. Lectures by guest speakers or members are a feature of many meetings at which there is ample opportunity for informal discussion between members with similar interests. Forums are also conducted by members on their own particular interest so that others may participate in discussions.

SUBSCRIPTIONS

Ordinary Member	$20.00
Country Member	$16.00 (Over 100 km from GPO Melbourne)
Student Member	$12.00
Associate Member	$ 5.00 (No News Bulletin)

No additional fee is payable for overseas posting by surface mail of the news bulletin. Associate Members, resident at the same address as, and being immediate relatives of an ordinary Member, do not automatically receive the Society's publications but in all other respects rank as ordinary Members.

Cover design by Alan Hyman.

Cover illustration of *Synlestes weyersii tillyardi* (O.: Synlestidea) ♂ by Catherine Symington.

MINUTES OF THE GENERAL MEETING, 20 FEBRUARY 1998

The President, A. Kellehear, opened the General Meeting at 8:03 pm

Present: P. Carwardine, C. Dickson, D. Dobrosak, I., Endersby, A. Kellehear, D. & N. Stewart, R. Vagi

Visitors: M. Endersby, P. Horne, M. Mercer

Apologies: E. & P. Grey

Minutes: Minutes of the 12 December 1997 General Meeting [*Vic. Ent.* 28(1):1-2] were accepted (I. Endersby/P. Carwardine).

Treasurer's Report: The Treasurer presented the financial statement as of 20 February 1998:

Account balances stand at: General Account $5,056; Le Souëf Award Account $3,305. Membership is 103 plus 7 Associate members and 10 subscribers. (I. Endersby/D. Dobrosak).

Editor's Report:

The Editor reported that articles were in hand for the April issue.

Correspondence:

- Request from Oxford University Press to review Dr. T. News book titled "Butterfly Conservation second edition". (Any reader interested in reviewing this book is requested to contact the Hon. Editor)

General Business:

Membership: J. Tinetti, C. Peterson and J. Weemaes were elected to membership. Applications for membership were received from Dr. R. Briggs and G. Forbes.

Speaker: "Integrated Pest Management and the role of Native Insects as predators" by Dr. Paul Horne

Dr. Paul Horne of IPM Technologies Pty Ltd presented an interesting and informative talk on Integrated Pest Management and the role native insects can play in pest control. Dr. Horne is an IPM consultant and presently breeds the cosmopolitan wasp, *Orgilus lepidus* as a biological control agent for pests in potato crops. IPM Technologies Pty Ltd are applying the same IPM principles to reduce insecticide use in vineyards.

Dr. Horne commenced his presentation by showing slides of some of the conventional pest control methods used in Agriculture. Insecticide delivery by crop dusting, tractor booms and misters have been used to reduce the effects of insect pests upon crop production. The presence of a monoculture which exists in most agricultural ecosystems is a recipe for disaster due to the opportunist pests which can multiply in a short time frame to take advantage of the cultivated food source. Studies have shown that insecticide spraying is rarely applied in optimal quantities and times and also kills beneficial insects. Resistance to insecticides, residues in produce and

run off into the environment are additional problems with the conventional approach to pest control.

An integrated pest management approach seeks to manage pests, not eradicate them. This is achieved by monitoring pest and beneficial species and making decisions based on the results of monitoring programs.

Dr. Horne spoke about the native insects which are predatory upon pests and showed slides of some of the beneficial insects. These included Coccinellidae species such as the common transverse ladybird beetle *Coccinella transversalis* (*repanda*) which are voracious predator in the larval and adult forms; brown lacewings (Chrysopidae); green lacewings (Hemerobiidae); ground beetles (Carabidae) and native earwigs (eg. *Labidura truncata*). Other native insects which are not commonly regarded as beneficial (or predatory) are plague soldier beetles: *Chauliognathus lugubris* (Cantharidae) and Melyridae beetles such as *Dicranolaius bellulus*.

The speaker was thanked by the audience for his informative and well presented talk.

General Business:

Membership: J. Tinetti, C. Peterson and J. Weemaes were elected to membership. Applications for membership were received from Dr. R. Briggs and G. Forbes.

Organ Pipes photographs: It was pointed out that a credit for the photographs of the Organ Pipes National Park survey were not included [*Vic Ent* 28 (1): 14]. N. Stewart kindly provided the photographs.

Observations: P. Carwardine reported seeing a Caper White, *Belenois java*, in Malvern in January. It was noted that the Caper white was not common this season.

The meeting was closed by the President at 9:03 pm

MINUTES OF COUNCIL MEETING, 20 MARCH 1998

The President, A. Kellehear, opened the meeting at 8.02 pm

Present: P. Carwardine, D. Dobrosak, I Endersby, A. Kellehear, R. MacPherson, N. & D. Stewart.

Minutes: Minutes of the 21 November 1997 Council Meeting [*Vic. Ent.* 27(6):105-106] were accepted (I. Endersby/A. Kellehear).

Treasurer's Report: The Treasurer presented the financial statement as of 20 March 1998:

Account balances stand at: General Account $4,757; Le Souëf Award Account $3,305. Membership is 104 plus 7 Associate members and 10 subscribers. I. Endersby reported that the costs incurred by the Society, including producing *Victorian Entomologist*, were being covered by current subscriptions and therefore advised that the cost of subscriptions for 1998 could remain at the current rates.

Editor's Report:

The Editor reported that a large number of articles were received in the last few weeks and there were now sufficient articles in hand for the next two issues of *Victorian Entomologist*. Further articles would be most welcome for later in the year.

Excursions Secretary's Report:

P. Carwardine reported that the 28 February 1998 survey of the Organ Pipes National Park was relatively poorly attended but the weather was fine and further new species, particularly Coleoptera and Odonata were collected on this excursion. A further survey in September was proposed and the date for this excursion will be discussed at future General Meetings.

Correspondence:

- An email from I. Faithfull correcting the report on his exhibits at the 12 December 1997 General Meeting [*Vic. Ent.* **28(1)**:2]. The corrected text is: "I. Faithfull exhibited *Opuntia stricta* from Eldorada infested with the cochineal insect *Dactylopius opuntiae* and an old dried cladode from Queensland which had been infested with *Cactoblastis cactorum*."

General Business:

Archives: A. Kellehear reported that he had not been able to contact T. New about the Society's archives and would endeavour to report on this matter at the next council meeting.

Format of Council Meetings: I. Endersby reported that the Society's constitution allowed flexibility in the number and timing of Council Meetings. Council meetings could be held before or after General Meetings. Council agreed to monitor the durations of council meetings to determine if this would be a feasible option at some time in the future.

Duration of General Meetings: N. Stewart reported that the length of some General Meetings were relatively short and this may be an area of dissatisfaction with members, particularly those that need to travel considerable distances to attend meetings. Council resolved to address this matter by arranging additional exhibits and talks by members at the conclusion of General Meetings.

Advertising: Council examined the options of advertising the Society or preparing a press release about the Society for local newspapers. D. Dobrosak reported that the general Meetings would continue to be advertised in The Age's EG and Society programs would continue to be distributed at local Universities and Greens Bookshop.

Regional Councillor to AES: R. MacPherson requested that Council accept his resignation from this position. Discussions regarding obtaining another Regional Councillor were canvassed.

The meeting was closed by the President at 9:14 pm

THE IDENTIFICATION OF *GAHNIA* FORST. & FORST. F (CYPERACEAE) EATING HESPERIIDAE (LEPIDOPTERA) USING IMMATURE STAGES

R. GRUND
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Abstract
Morphological characters of the immature stages of the *Gahnia* Forster & Forster f. eating Hesperiidae are documented, enabling lepidopterists and naturalists to identify species other than by the use of the highly diagnostic, but rare, operculums.

Introduction
Lepidopterists and naturalists have often come across the immature stages of Hesperiidae skippers in *Gahnia* clumps, particularly at some obscure place at an inopportune time, and have wondered, "What skipper is this?"

Common and Waterhouse (1981), and many previous and subsequent authors have always advocated the use of operculums (pupal caps) to identify the skippers. Although these operculums are highly diagnostic, they are unfortunately only encountered at certain times during the breeding season. It is more common to find an empty pupal case (minus the operculum), a larva or a larval skin shed during ecdysis. If these latter stages could be reasonably well identified then better surveys of skipper populations within *Gahnia* communities could be undertaken, particularly for conservation purposes, as most of these communities are now subject to a high degree of human disturbance.

Gahnias are sedge plants belonging to the Cyperaceae family. There are about 40 described species, with a distribution in East and South East Asia, Australasia, Polynesia and Hawaii, but do not occur in Africa, Europe or the Americas. (This distribution looks remarkably like it may have been influenced by migratory wetland birds!) In Australia, where there are about 22 recognised species (20 endemic), the *Gahnia* taxonomy is currently under revision. In Papua New Guinea there are 3 species, while in New Zealand there are 6 species (5 endemic). Most of the Australian species occur in temperate wetlands, cool upland areas or coastal regions having continuous annual rainfall. These species usually have coarse, scabrous (cutting), long and narrow strap-like leaves and are capable of growing into clumps 3 m high and 5 m across. Very few species occur in the tropics and none have been reported in the Northern Territory. A few specialised species thrive in limestone based mallee and these are usually low growing, with narrow or wiry leaves.

Eighteen of the *Gahnia* species are known to serve as foodplants for butterflies (Table 1). In Australia they are foodplant for four endemic Hesperiidae genera (Table2), *Toxidia* (1 species), *Antipodia* (3 species), *Hesperilla* (9 species) and *Oreisplanus* (1 species), and also for two endemic Satyrinae genera (Hypocystini - Miller, 1968), *Heteronympha* (1 species) and *Tisiphone* (2 species). In New Zealand it is foodplant for one endemic Satyrinae (Hypocystini) species. Surprisingly, there are no Hesperiidae in New Zealand. Gahnias have not been recorded as foodplant for butterflies in other neighbouring countries, (although *Hesperilla malindeva*, has been found on Moa Island in Torres Strait and is therefore likely to be eventually found in the adjacent districts of Papua New Guinea where its *Gahnia* foodplant also occurs). The list of *Gahnia* foodplants is based mainly on published sources, but also includes unpublished foodplant data collected by the author.

Gahnia Species	(Abbreviation)	Comments	Distribution
ancistrophylla Benth.	an	small,soft	WA,SA,V
aspera (R.Br)Sprengel	as	medium,coarse	NSW,Q,PNG,Polynesia,Malesia
clarkei Benl	e	large,coarse	SA,V,NSW,Q
decamposita (R.Br)Benth.	de	large,coarse	WA
deusta (R.Br.)Benth.	du	small,coarse,(mallee)	WA,SA,V
erythrocarpa R.Br.	e	large,coarse	NSW,Q*
filifalia (C.Presl)Benl	fa	small,soft	NSW
filum (Labill.)F.Muell.	fm	large,coarse,(saline)	WA,SA,T,V,NSW
grandis (Labill.)S.T.Blake	g	large,coarse	T,V,NSW
lanigera (R.Br.)Benth.	l	small,wiry,(mallee)	WA,SA,V,NSW
melanacarpa R.Br.	me	medium,coarse	T**,V,NSW,Q
microstachya Benth.	mi	small,soft	T,V,NSW
pauciflora Kirk	pa	large,coarse	NZ
procera J.R. et G. Forst.	pr	medium,coarse	NZ
radula (R.Br.)Benth.	r	medium,coarse	SA,T,V,NSW
sieberiana Kunth	sb	large,coarse	SA,T,V,NSW,Q,PNG,NCal
subaequiglumis S.T.Blake	su	small,coarse	V,NSW,Q
trifida Labill.	t	large,coarse	WA,SA,T,V,

Comments: small = <0.5m, medium = <1m, large = >1m growing height.
* Reported by Common & Waterhouse 1981 from Burleigh Heads, but otherwise not recorded from Queensland. ** Reported by Couchman 1965 as the possible foodplant for *Hesperilla mastersi marakupa* but cannot be substantiated by the Tasmanian Herbarium.

Table 1. *Gahnia* species used as foodplant by butterflies, and their distribution.

Species involved

The immature stages of the *Gahnia* eating Satyrinae in Australia are easily recognisable (Common and Waterhouse 1981), and will not be further mentioned. The *Gahnia* eating Hesperiidae all belong to the largely endemic subfamily Trapezitinae. This subfamily is further clearly divisible into three tribes (Waterhouse 1932, Atkins 1973), each of which contain closely related genera having (among other characters), very similar immature stages and life histories.

The first of these is the Trapezitini in which the immature stages are characterised by the larvae being fat and humped, usually brown with large, dark, coarsely rugose heads, and the pupae being short and fat, with minimal sclerotisation of the opereulum, the abdomen having short bristles, and the cremaster being very long and spinose. The larvae/pupae shelters, if constructed of the foodplant, open at the top, but more often the shelters are made from extraneous leaf debris that has fallen into or adjacent to the foodplant. The larvae mostly feed on grasses (Gramineae/Poaceae), and *Lomandra* or related genera (Liliaceae/Xanthorrhoeaceae). However, there is one *Gahnia* eating species *Taxidia peron,* and its immature stages are typical for the tribe, easily recognisable (Common and Waterhouse 1981), and quite distinct from the other *Gahnia* eating Hesperiidae and will not be mentioned further.

The second tribe is the Mesodinini in which the immature stages have variable characters somewhere between the Trapezitini and the following tribe. The larvae are relatively short,

Butterfly Species	*Gahnia* species
Family Hesperiidae	
Subfamily Trapezitinae	
Tribe Trapezitini	
Toxidia peron (Latreille)	sb
Tribe Mesodinini	
Antipodia atralba (Tepper)	an,du,l
Antipodia dactyliota (Meyrick)	l
Antipodia chaostola (Meyrick)	fa,g,mi,r,sb
Tribe Hesperillini	
Hesperilla maliudeva Lower	as
Hesperilla idothea (Miskin)	c,g,me,r,sb,su,t
Hesperilla donnysa Hewitson	an,as,c,dc,du,e,fa,fm,g,l,(me),mi,r,sb,su,t
Hesperilla flavescens Waterhouse	fm,(r)
Hesperilla chrysotricha (Meyrick and Lower)	dc,(du),fm,mi,r,sb,t
Hesperilla mastersi Waterhouse	me
Hesperilla ornata (Leach)	as,c,e,me,r,sb
Hesperilla picta (Leach)	c,(e,me)
Hesperilla crypsargyra (Meyrick)	mi,sb
Oreisplanus perornata (Kirby)	(e),sb
Family Nymphalidae	
Subfamily Satyrinae	
Tribe Hypocystini	
Heteronympha merope (Fabricius)	sb
Tisiphone abeona (Donovan)	as,c,e,g,me,mi,r,sb
Tisiphone helena (Oliff)	sb
Dodonidia helmsii Butler	pa,pr
	() need further substantiation

Table 2. Butterfly species that use *Gahnia* as foodplant, and the documented *Gahnia* species upon which they feed.

fattish and cylindrical, tapering posteriorly, and with large, usually hairy heads and the pupae being shortish, cylindrical or tapering posteriorly, with a moderately sclerotised operculum, the abdomen being smooth, the cremaster being short and spinose, and the larvae/pupae shelter usually tent-like and opening at the bottom. The larvae feed on grasses, sedges or Iridaceae. Within this tribe there are three *Gahnia* eating species, all belonging to the genus *Antipodia*.

The third tribe is the Hesperillini in which the immature stages are characterised by the larvae being long and cylindrical, semi-translucent green with brown coloured heads having black longitudinal markings, and the pupae being long, cylindrical with abundant, specialised, black sclerotisation of the operculum, the abdomen being bristly, the cremaster having variable shape, and the larvae/pupae shelter being tubular and opening at the top. The larvae feed on sedges (Cyperaceae). Most of the *Gahnia* eating Hesperiidae belong to this tribe, and mostly to the large genus *Hesperilla* but with a single species within *Oreisplanus* (refer Common and Waterhouse 1981).

The genus *Hesperilla* is also clearly divisible into three sections of butterflies having similar adult characters. The *H. donnysa* section from southern Australia in which the adults have uniform coloured hindwings beneath; the *H. ornata* section from eastern Australia in which the adults have distinctly banded abdomens and patterned hindwings beneath; and the sombre coloured *H. malindeva* section (Atkins 1978) from northern Australia distinctive for having a unique operculum pattern in the pupae. The latter group probably have sufficient, different characters (including hemi-spheroidal eggs, and unique wing venation and genitalia) to be placed in their own genus. Within the *H. donnysa* section, current data suggests *H. flavescens* is at most a semi-species or more probably a unique varietal form within the *H. donnysa* cline (as a possible relict from the iee age). Preliminary results of allozyme studies being undertaken at the South Australian Museum would tend to confirm the latter. In this paper *H. flavescens* is retained as a separate species.

Methodology

The immature stages used for the identification of the *Gahnia* eating Hesperiidae, are primarily the larvae and pupae. The manner in which the larvae construct their shelters is also important. The identifying characters of the larvae (and cast larvae skins) include their shape and colour, head markings and hairiness, and secondary setae. Pupae characters include colour, operculum shape, pupal bristles, cremaster shape and hooks. Most of these characters are visible with the naked eye or with a hand lens, although some of the larvae secondary setae might require the use of a binocular microscope. When disassembling abandoned shelters it is important to do this carefully and collect both the empty pupal case and the final larval casting, (and sometimes the definitive operculum may still be present). The collected pieces need to be kept separate from the remains of other shelters, as it is very easy to transpose the pieces.

It is important to know the species of *Gahnia* in the community. A rough guide is provided in Table 1. A few of the *Gahnia* eating skippers are mono-phytophagous (*H. malindeva*, *H. mastersi* and probably *H. flavescens* s.s.), others are nearly so (2-3 *Gahnia* species), while the remainder are strongly poly-phytophagous with *H. donnysa* having been found on all the documented *Gahnia* foodplants. Habitat is also important (largely obtained through experience), as some skippers like their foodplant to be in full sun (*A. atralba*, *A. dactyliota*, *H. flavescens*, *H. chrysotricha*), some prefer heavy shade (*H. idothea*, *H. mastersi*, *H. picta*), while others are not particular. Although females will lay eggs only on certain *Gahnia*, the larvae, particularly the more mature instars will often accept other *Gahnia* as foodplant in captivity.

Identification Criteria

Egg characters (Table 3). (To save on space in the comparative tables (3, 4 and 5), the Hesperiidae have been abbreviated to their initials, but they follow the same format as in Table 2.) There are differences in the eggs between the species, either in colour, shape, size, or the intensity or number of fine vertical ribs. The ribs are very difficult to count, even with the aid of a microscope and therefore the use of eggs as a casual identifying medium is not proposed, although detailed knowledge of the egg can be diagnostic. Known eggs are some shade of yellow through to green. In the *H. malindeva* section the eggs are hemi-spheroid (plan view) with less than 35 vertical ribs (Atkins 1978). In *Antipodia*, *Oreisplanus* and the southern Hesperillini, the eggs are hemi-ellipsoid (plan view) with usually more than 35 ribs (less than 35 in *H. idothea*). In *H. chrysotricha* and *O. pernornata* the vertical ribs are almost non-existent. The egg of *O. pernornata* is also significantly bigger than those of the other species (like *Motasingha trimaculata*). There are good egg photographs of the southern Hesperillini in Fisher 1978. In the patterned Hesperillini the shape is also hemi-ellipsoid (plan view) with less

than 35 vertical ribs. The degree of ellipticity is more pronounced in *Antipodia* and the southern Hesperillini.

Species	Colour	Shape (plan view)	Ellipticity	Vertical Ribs
A.a.	pale green	hemi-ellipsoid	1.21	50-52
A.d.	pale green	hemi-ellipsoid		40-48
A.c.	pale green	hemi-ellipsoid		36
H.mal.	pale green	hemi-spherical	1	26-33
H.i.	pale green	hemi-ellipsoid	1.08	20-30
H.d.	pale cream	hemi-ellipsoid	1.22	37-50
H.f.	pale green	hemi-ellipsoid	1.25	40
H.chrys.	pale green	hemi-ellipsoid	1.24	54 (very obscure)
H.mas.	cream	hemi-ellipsoid		24
H.o.	pale yellow green	hemi-ellipsoid		28
H.p.	pale yellow green	hemi-ellipsoid	1.13	30-31
H.cryp.	pale green	hemi-ellipsoid	1.12	27-29
O.p.	cream	hemi-ellipsoid	1.13	40-50 (very obscure)

Table 3. Comparison of egg differentiating characters.

Shelter characters. Larvae shelters are characteristic for several species. In the Hesperillini the opening is always at the top, and the leaves are usually fastened in a straight mode, but in *H. chrysotricha* and *H. mastersi* the leaves are usually fastened spirally. *H. picta* constructs a very weak shelter within the new *Gahnia* growth, and it will often go without a shelter during the larval stage. Just before pupation, *H. chrysotricha* is the only *Gahnia* eating species to block the shelter entrance with a silken web. In *Antipodia*, the shelter opening is always at the bottom, and the leaves are fastened spirally. Due to the different habitat requirements and distribution of the *Antipodia* species, recognition of the bottom entrance to the shelter is sufficient to identify the species.

Larvae characters (Table 4). **Colour and shape**; the Hesperillini and Mesodinini have characteristic shape, mentioned above. They are usually a shade of semi-translucent green, sometimes bluish or yellowish, and the dorsal area may be brownish (*A. atralba, H. mastersi*) or even purplish (*H. malindeva*). Young larvae of *A. chaostola* and *O. perornata* are distinctly yellowish, while second and older instars of *A. chaostola* are unique in having a bright red prothorax. Immature instars of most species have two dorsal pairs of longitudinal white lines, and occasionally an indistinct pale lateral line. These white lines occasionally carry through to the final instar, particularly in the patterned species of Hesperillini and in *Antipodia*. The dorsal lines are continuous onto the last segment (anal plate) in *H. picta*, but cease before the last segment in the other species.

Head (Figs 1-12); in the mature larvae all species have light brown coloured heads, with a dark brown to black triangular mark in the front (tapering dorsally), and dark brown to black side stripes of varying intensity and length. In some species the side stripes are either permanently absent (*H. chrysotricha, H. picta*), or are always continuous to the top of the head (*H. idothea, H. malindeva*). In some of the Hesperillini are developed yellowish 'cheek' pouches in the lower

part of the head between the front and side stripes (strongly in *H. idothea*, *H. mastersi*, weakly in *H. ornata*, *H. picta*). In some species the top of the frons is paler coloured than the rest of the black coloured frontal triangle, producing a characteristic, inverted V mark (*H. idothea*), or there may be a small yellow triangular area developed within the frons (*H. picta*, *H. crypsargyra*). There are varying degrees of setae (hair) development in mature larvae (apart from the long sensory hairs around the mouthparts), consisting of well-developed long hairs in the *Antipodia*, scattered long hairs in *H. chrysotricha*, and short hairs in the other species. Head rugosity and head secondary setae are also sometimes useful, but not considered here. (Caution; most of the above characters are not fully developed in immature larvae, particularly the head colour which is black or dark coloured).

Secondary setae (Figs 35–46); these are common along the body but are best developed on the last segment. Most of the species have wineglass or vase shaped secondary setae, with sunken apices. They are set on raised, hemi-spherical bases that are usually coloured dark-brown on the anal plate but are clear along the skin. The setae shape can be classic wineglass, sometimes squat or sometimes with an elongated stem (Figs 40-41), or they can be straight sided (divergent from the base in a vase shape) and again they can be squat or elongated (Figs 42-44). In extreme cases they can be elongated into long spinose shapes (Fig. 46, *H. chrysotricha*, *H. picta*). Occasionally the ends may be flat or convex, particularly in the long spinose shapes, or there may be a smaller convex bubble within the sunken apex of extended vase setae (Fig. 45, *A. atralba*, *A. dactyliota*). Secondary setae occurring along the body are usually similar to the anal-plate setae but are much smaller and often squat shaped if the anal plate setae are of wineglass type.

Pupae characters (Table 5). **Colour and shape**; the Hesperillini and Mesodinini have characteristic shape, mentioned above. Living pupae vary in colour from pale green to yellow, through shades of brown (sometimes with green or yellow areas) to uniform brownish black. (The green colour changes to yellow as the pupa matures.) The empty pupae cases then become clear (white), through shades of brown to dark brown. In some species the pupae cases are consistently clear (*H. idothea*, *H. picta*) or dark brown (*H. chrysotricha*), while others have a range of colours dependent on the collection area. The eastern patterned Hesperillini are often characterised by a heavy white waxy coating or bloom, particularly on the anterior parts, although all pupae have a thin, white bloom coating when fresh.

Operculum; these are distinctive for each species and often each genus or section. They are black and brown, irrespective of the pupa colour. The species in the *H. malindeva* section have unique flattened, horseshoe shapes (Atkins 1978). *Oreisplanus* and most of the patterned Hesperillini have bifid projections, while the remainder have some form of rounded operculum, except in *H. donnysa* and *H. flavescens* where it is flat. All the opercula, except for *O. perornatus*, which is included as Fig. 34, have been illustrated in Common and Waterhouse 1981 and in Atkins 1978, 1984. The opercula for all the *Galmia* eating Hesperiidae have long, spinose (simple) setae, in contrast to many Trapezitini and some Mesodinini (*Herimosa*) which have branched setae.

Pupal bristles; these are present only in the Hesperillini (absent in *Antipodia*). They are found along the abdominal area and occur as long, bristly setae serving a similar function to the cremaster hooks. They are usually well developed, except in *H. idothea* where they are sparse and considerably reduced in length. They are either brown or black coloured and are usually unhooked at the ends, although in *Oreisplanus* and *H. crypsargyra* they are hooked as in the cremaster. They emanate from characteristic bases that can be either striated or smooth, triangular/conical shaped. In *H. chrysotricha* the bases are tubular looking, lacking the conical projection.

Cremaster (Figs 13-33); these can be as diagnostic as operculums. Their basic construction (when viewed dorsally) is of two posteriorly converging lateral ridges (V shape) which do not actually meet at the posterior end of the cremaster. The ridges are often ornamented with secondary ridges and spines (carrying long hairs), and are usually separated by a smooth furrow. The different cremaster shapes result from the secondary ornamentation, the width of the furrow, and the length of the cremaster. The two ridges invariably produce some form of bifid projection at the end of the cremaster, which can be exaggerated or barely noticeable. Most of the cremasters are some form of spinose shape, one is strongly bifid (*H. idothea*), while three are wedge shaped (*H. donnysa, H. flavescens, H. mastersi*). The colour of the cremaster can also be characteristic. All have long reddish-brown cremaster bristles/hooks, which are hooked at the ends except in *O. perornata* where the hooks are weakly formed or not formed at all. The bristles are flattened in the plane of the hook, obviously for structural strength, although in *H. chrysotricha* this flattening is only weakly developed. The placement of the cremaster hooks can be diagnostic. They being situated either terminally at the end of the cremaster (*Antipodia, H. malindeva*), or placed ventrally either in a small group or in a semi-circular pattern, near the end of the cremaster.

Summary

The colour parameters are the most variable of the listed identifying characters and are likely to vary geographically for many species. However, the structural characters, like setae and cremaster are definitive. The preceding data should enable a reasonably adequate identification of the immature stages, and particularly if both pupal shell and larval skin (or larvae) can be found. For example, in Fisher 1978 (with the permission of Fisher), on page 89, photograph D identified as *H. idothea* is actually *H. donnysa* or *H. flavescens*. On page 99, photograph B identified as *H. chrysotricha*, is actually *H. idothea*.

Acknowledgements

Thanks to Andrew Atkins for permission to reproduce his larval head drawings of *H. malindeva*, and to the South Australian Museum for permission to use their photographic equipment.

References

ATKINS, A. 1973. A new genus *Proeidosa* for an Australian skipper, *Pasma polysema* (Lower) (Lepidoptera: Hesperiidae: Trapezitinae). *Journ. Aust. Ent. Soc.* 12(4): 253-260.

ATKINS, A. 1978. The *Hesperilla malindeva* group from northern Australia, including a new species (Lepidoptera: Hesperiidae). *Journ. Aust. Ent. Soc.* 17(3): 205-215.

ATKINS, A. 1984. A new genus *Antipodia* (Lepidoptera: Hesperiidae: Trapezitinae) with comments on its biology and relationships. *Aust. Ent. Mag.* 11(3): 45-58.

BLAKE, S.T. 1948. The Cyperaceae collected in New Guinea by L.J. Brass, III. *Journ. Arnold Arb.-Harv. Univ.* 29(1): 90-102.

BRABY, M.F. 1993. Early stages, biology and taxonomic status of *Tisiphone helena* (Oliff) (Lepidoptera: Nymphalidae: Satyrinae). *Journ. Aust Ent. Soc.* 32: 273-282.

BUCHANAN, A.M. (Ed). 1995. *A Census of the Vascular Plants of Tasmania & Index to the Student's Flora of Tasmania.* 93pp. Tasmanian Herbarium, Hobart

COMMON, I.F.B. and WATERHOUSE, D.F. 1981. *Butterflies of Australia.* 682pp. Angus and Robertson, Sydney.

COUCHMAN, L.E. 1965. Notes on some Tasmanian and Australian Lepidoptera-Rhopalocera. II. *Proc. R. Soc. Tasm.* 99: 81-85.

CROSBY, D., GULLEN, P. and QUICK, N. 1996. *Victorian Butterfly Database.* CD-Rom. Viridans, Brighton East, Victoria.

DUNLOP, C.R. et al. 1995. *Checklist of the Vascular Plants of the Northern Territory, Australia.* 111pp. Cons. Comm. N.T.

DUNN, K.L. and DUNN, L.E. 1991. *Review of Australian Butterflies: distribution, life history and taxonomy*, Parts 1-4. 660pp. Published by the authors, Melbourne.

FISHER, R.H. 1978. *Butterflies of South Australia.* 272pp. Government Printer, Adelaide.

GIBBS, D.W. 1980. *New Zealand Butterflies: Identification and Natural History.* 207pp. Collins, Auckland.

GREEN, 1985. *Census of the Vascular Plants of Western Australia.* 2nd ed. 312pp. W.A. Herbarium, Perth.

HARDEN, G.J. (Ed). 1993. *Flora of N.S.W.* **4**. 775pp. Royal Botanic Gardens, Sydney.

JESSOP, J.P. (Editor) 1993. *A List of the Vascular Plants of South Australia*, (Edition IV). 151pp. The Botanic Gardens of Adelaide and State Herbarium.

MATTHEW, R.W. 1990. New *Gahnia* Forst. & Forst.F. foodplant records for three Western Australian skippers (Lepidoptera: Hesperiidae). *Aust Ent Mag* 17(4): 113-114.

MCDONALD, W.J.F. and ELSOL, J.A. 1984. *Moreton Region Vegetation Map Series. Summary Report & Species Checklist for Caloundra, Brisbane, Beenleigh & Murwillumbah Sheets.* 247pp. Qld Dept. Prim. Ind., Brisbane.

MILLER, L.D. 1968. The higher classification, phylogeny and zoogeography of the Satyridae (Lepidoptera). *Mem. Am. Ent. Soc.* **24**: 1-174.

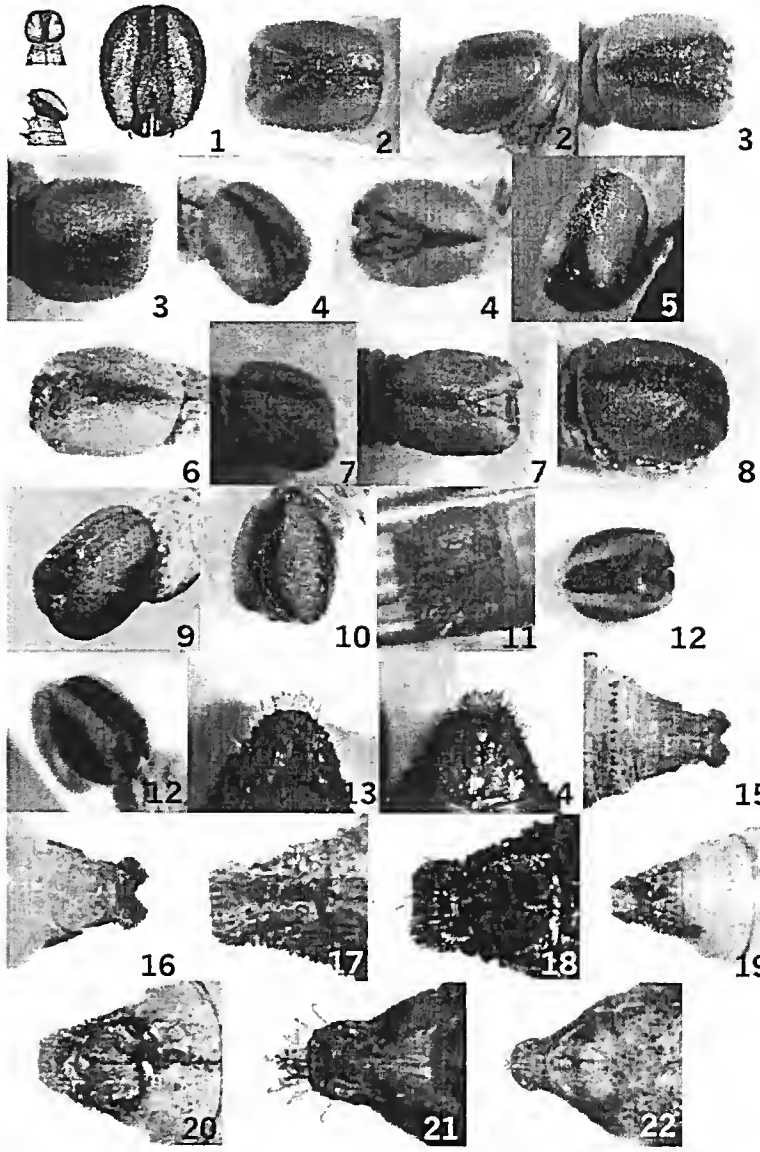
MOORE, L.B. and EDGAR, E. 1970. *Flora of New Zealand.* **2**. 354pp. Government Printer, Wellington.

MULLER,C.J. 1992. New *Gahnia* Forst. & Forst.F. food plant records for *Hesperilla ornata ornata* (Leach) and *Tisiphone abeona regalis* Waterhouse (Lepidoptera: Hesperiidae and Nymphalidae) in New South Wales. *Aust Ent. Mag.* 19(4): 102.

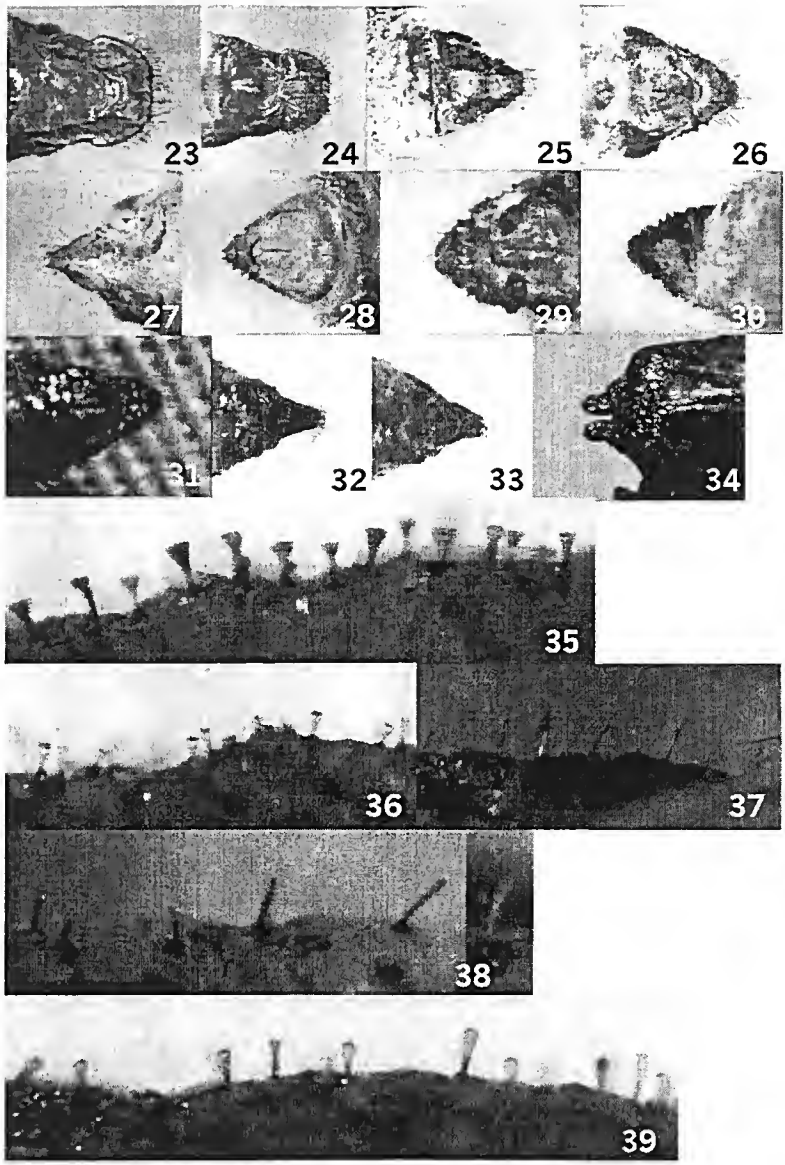
NIELSEN, E.S., EDWARDS, E.D. & RANGSI, T.V. (Eds). 1996. Checklist of the Lepidoptera of Australia. *Monogr. Aust. Lepid.* **4**. 529pp. CSIRO Publishing, East Melbourne.

WATERHOUSE, G.A. 1932. *What Butterfly is That?* 291pp. Angus and Robertson, Sydney.

WILLIAMS, A.A.E. 1993. A new larval food plant for *Hesperilla donnysa albina* Waterhouse (Lepidoptera: Hesperiidae) in Western Australia. *Aust. Ent.* **20**(2): 72.



Figs 1-22: Larvae head markings: *H. malindeva* (1), *H. idothea* (2), *H. donnysa* (3), *H. chrysotricha* (4), *H. mastersi* (5), *H. ornata* (6), *H. picta* (7), *H. crypsargyra* (8), *O. peromatus* (9), *A. atralba* (10), *A. dactyliota* (11), *A. chaostola* (12). Pupae cremasters: *H. malindeva* (recto 13, vento 14), *H. idothea* (recto 15, ventro 16), *H. donnysa* (recto 7, ventro 18), *H. flavescens* (recto 19, ventro 20), *H. chrysotricha* (recto 21, ventro 22).



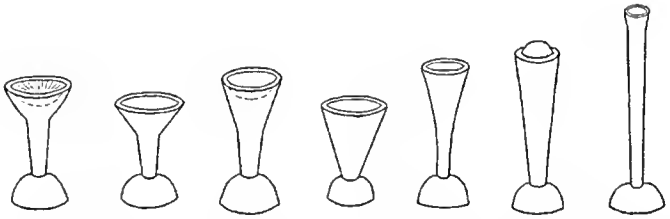
Figs 23-39: Pupae cremasters: *H. mastersi* (recto 23, ventro 24), *H. ornata* (recto 25, ventro 26), *H. picta* (recto 27, ventro 28), *H. crypsargyra* (recto 29, ventro 30), *O. perornatus* (ventro 31), *A. atralba* (recto 32, ventro 33). Operculum of *O. perornatus* (34). Anal plate secondary setae (composite sections): *H. donnysa*-typical wineglass shape (35), *H. flavescens*-wineglass and vase shapes (36), *H. chrysotricha*-spinose shape (37), *H. picta*-spinose shape (38), *A. atralba*-vase shape with convex apex (39).

Species	Larva colour	White dorsal lines on mature larva	Head markings			Yellow cheek marks	Long head hairs	Secondary setae on anal plate
			Frontal mark	Inverted V or white triangle	Side bands			
A.a.	bl grn, grn	yes	brnish blk, broad	no	very broad, variable intensity, nearly to top	no	yes	vase, often with convex apex
A.d.	bl grn, grn	yes	brnish blk, broad	no	very broad, variable intensity, nearly to top	no	yes	vase, often with convex apex
A.c.	yellow green, prothorax red	no	brnish blk, broad	occasional	very broad, occasionally to top	no	yes	wineglass & vase
H.mal.	grnish, pinkish purp	yes	dk brn, med width	no	broad to top	no	no	?
H.l.	pale green	no	brn, med	yes	med broad, to top	yes	no	wineglass & vase
H.d.	pale green	no	brnish blk, broad	no	med broad, variable length from small brown blotch to rarely reaching top	no	no	wineglass & vase
H.f.	bluish green	no	brnish blk, broad	no	med broad, variable length	no	no	wineglass & vase
H.chrys.	yellowish green	no	brn to brnish blk, medium to narrow	very rare	none	no	yes	spinose
H.mas.	yell grn, dorsally brown	yes	brnish blk, med	rarely	dk red brn, broad, do not reach top, occasionally indistinct	yes	no	wineglass & vase
H.o.	yell grn, bl grn	yes	brn to brnish blk, narrow to broad	no	none to broad, variable length from none to reaching top	indistinct	no	wineglass & vase
H.p.	yell grn, grn yell, brnish posterior	yes	brn, narrow	yes	none	indistinct	no	spinose
H.cryp.	green	yes	brnish blk, narrow to medium	yes	none to med broad, variable length from none to rarely reaching top	no	no	wineglass & vase
O.p.	yellowish green	yes	brnish blk, med to broad	rarely	none to broad, variable length from none to reaching top	no	no	wineglass & vase

Table 4. Comparison of mature larvae differentiating characters.

Species	Pupa live colour	Pupal shell colour	Heavy bloom	Cremaster		Location of cremaster hooks
				Colour	Shape	
A.a.	dk brn, dk brn & grn	dk brn, brn	no	brn, dk brn	spinose, short, striated dorsally (no hairs), end blunt and squared	terminally
A.d.	dk brn, dk brn & grn	dk brn, brn	no	brn, dk brn	spinose, short, striated dorsally (no hairs), end blunt and squared	terminally
A.c.	dk brn, brnish blk	dk brn	moderate	dk brn	spinose, short, striated dorsally (no hairs), end blunt and squared	terminally
H.mal.	brn with yell or grn	brn	no	brown	broadly spinose, very short, flattish, hairs dorsally, end rounded to very slightly bifid	terminally
H.i.	pale grn, yell grn	clear/white	moderate	brown	strongly bifid, expanded and flattened	periphero-ventral
H.d.	brnish blk, brn with yell or grn	dk brn, brn	no	brn, blk	wedge shape, flattened, end straight edged	periphero-ventral
H.f.	brnish blk, brn with yell or grn	dk brn, brn	no	brn, blk	wedge shape, flattened, end straight edged	periphero-ventral
H.chrys.	brnish blk, rarely grnish or yellowish	dk brn, brn	no	dk brn, blk	spinose, long, striated dorsally (no hairs), end blunt or rarely slightly bifid	termino-ventral
H.mas.	pale grn, dk brn & grn	brn	moderate	brown	wedge shape, flattened, end rounded	periphero-ventral
H.o.	pale brnish grn or yell	el/wh, lt brn	yes	brn, dk brn	spinose, short, dorsally hairy, end blunt to very slightly bifid	periphero-ventral
H.p.	pale green or yellow	clear/white	yes	yellowish brn	spinose, short, dorsally often very narrow with some hairs, end acutely bifid	termino-ventral
H.cryp.	pale grn, dk brn	el/wh, dk brn	yes	brown	broadly spinose, short, hairs dorsally, end bluntly rounded to occasionally slightly bifid	periphero-ventral
O.p.	pale grn, dull black	el/wh, dk brn	moderate	black	broadly spinose, short, flattish, hairs dorsally, end rounded to occasionally slightly bifid	periphero-ventral

Table 5. Comparison of pupae differentiating characters.



Figs 40-46: Secondary setae: wineglass shapes (40-41), vase shapes (42-44), vase shape with convex apex (45), spinose shape (46).

THE SMALL COPPER AT ORGAN PIPES NATIONAL PARK

The Organ Pipes National Park is located approximately 20 km north-west of Melbourne and was declared a National Park in 1972. Its dominant feature is the organ pipes, a spectacular set of basalt columns which has been revealed by the deep valley cut by Jacksons Creek. Since the early 1970s, an extensive native revegetation program has been in place and many native animals, including insects have returned or continue to multiply in the area.

A small copper, *Lucia limbaria* Swainson, was observed near the summit of path leading down to the Organ Pipes formation at Organ Pipes National Park on the second survey of the park on 13 December 1997. The Society has been undertaking an insect survey of this park over the 1997/1998 season under a DNRE research permit (NP 978/103).

The identification of the small copper was confirmed by K. L. Dunn who was close enough to the specimen to be able to observe the cryptic ventral wing markings while the butterfly was resting upon leaf debris on the ground adjacent to the pathway. Reference to Common & Waterhouse, *Butterflies of Australia* 1981 reveals the small copper's foodplant to be the yellow wood sorrel, *Oxalis corniculata* and the larvae are attended by *Iridomyrmex* spp. ants. A return to the park on 28 February did not reveal any more sightings of the butterfly but the foodplant *O. corniculata*, identified by Ian Endersby, was found near the picnic ground adjacent to the organ pipes formation. The Viridans *Victorian Butterfly Database CD-ROM*, Version 1, 1996 shows records of *L. limbaria* in the two 10 x 10 minute latitude and longitude grid squares (approximately 15 km east-west wide) immediately to the west of the organ pipes indicating this rare species exists in the general area.

On the subject of coppers, it is interesting to note that specimens of the Eltham Copper, *Paralucia pyrodiscus lucida* are lodged with the Museum of Victoria from the grid square which includes the southern part of Organ Pipes National Park. These records were for 5 specimens taken at Keilor (exact location not known) by L. B. Thorn on 30 December 1920. Specimens of *P. p. lucida* were also taken on 7 January 1922 at Broadmeadows. No doubt these specimens were taken when *Bursaria spinosa*, *P. p. lucida* and its attendant ant (*Notoncus enormis*) were still extant in several areas of the Keilor plains grasslands.

My thanks to K. L. Dunn for commenting on this report and Catriona McPhee of the Museum of Victoria for assistance in obtaining the *P. p. lucida* record details.

Daniel Dobrosak

BUTTERFLY WATCHING IN TASMANIA - PART I

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Very little on Tasmanian butterflies has been written in popular style magazines in recent decades. When I first toured Hobart and Launceston in June 1979 I saw no butterflies, however, one of our Society members, Tony Morton, later visited in December 1987 and submitted a short account (Morton 1988) on his fortnight's Christmas holiday in the Scottsdale region where he encountered 14 species. I cannot recall any other entomo-travelogues, but on the more technical front there are Turner's early 20th century species compilations, followed by thorough taxonomic investigations by the late Len Couchman during the middle of this century. The 1980's concluded with two significant butterfly conservation reports by Brian Prince and, in this penultimate decade, some reports and papers on threatened satyrines authored by Mark Neyland have appeared. Dr Peter McQuillan's field guide, published in 1994, provides a handy tool for the keen butterfly observer.

Adding to this body of entomic literature, I present the first of a multi-part travel series dealing with my Tasmanian experience in which I include biological and taxonomic notes on some of the species encountered. This first part focuses on the montane region between Hobart and Queenstown, visited during mid January of 1996. As altitude is important in the local distribution of some forms I have included this data where pertinent. Readers should also be mindful that clock times are in ESST (i.e. daylight saving time; viz. EST+1hr). With these formalities dwelt with I will let the account begin...

Upon arrival in our southern-most state, I initially held little expectation of much insect life. The sky was overcast, sunny periods fleeting, and ambient temperatures, low. Almost too cold for butterflies, I reasoned. No Common grass-blues (*Zizina labradus*) greeted me as I ambled through Sandy Bay, a suburb of Hobart near Wrest Point Casino. Instead, during sunny moments, the odd Cabbage white (*Pieris rapae*) fluttered past and, soon after, a single Meadow Argus (*Junonia villida*) glided across a residential flower bed in search of nectar.

Later the same day (Jan. 16th) I ventured up to the summit of Mount Wellington to enjoy the panoramic view of the Derwent River Valley, Hobart - Australia's second oldest city - and the D'Entrecasteaux Channel. Mid way up, at The Springs, some 600m above sea level (asl), Cabbage butterflies and a rapid flying brown day-moth were active in alpine eucalypt forest, but higher up I held limited expectations of any active lepidopterans. At the summit (1271m) I was mildly surprised by sunny conditions, but strong icy winds made sight-seeing unpleasant - even for mid summer! In spite of the hazy sunshine, providing slight warmth, I was pleased to retreat to the shelter of my rental vehicle's cabin, where, after a few minutes contemplation, the thought of returning to the milder and sheltered coastal plain below became enticing. Butterfly observations on this peak (or elsewhere) would have to await another day.

Sunny conditions greeted me the following morning, and a maximum temperature of about 20°C or more had been forecast. Whilst the day slowly warmed I slipped in a visit to the Tasmanian Museum and Art Gallery in Hobart. The curator of Invertebrate Zoology, Roger Buttemore, kindly allowed access to the museum's relatively small butterfly collection, where, with my eye on my watch, some time was spent checking through the series of local satyrines:

By late morning temperatures were up and the sky was still clear. Rather than risk cold weather at the summit again, I decided to investigate the Wellington foot hills. The walking track to O'Gradys Falls seemed a good bet. The trail meanders through heath-woodlands where I would have expected to see several common species, but only a solitary female Fringed blue (*Neolucia agricola*) was encountered! The Tasmanian population of this lycaenid, which I regard as a 'local form' (see Dunn & Dunn 1991), has been popularly treated by many as the endemic subspecies, *insulana*, named in 1914. In spite of Couchman and Couchmans' (1977) general abundance assessment, I found it a fairly regular species (in heath-woodlands) where it was encountered at some six sites. I was surprised that butterflies were all but absent in this habitat; at this time of year in Victoria similar montane woodland would be alive with various skippers and browns. Unfortunately, Mount Wellington was severely damaged by bushfires in 1967 and, perhaps, nearly three decades later, the region is still recovering?

Indeed, the relict Tasmanian satyrine, *Nesoxenica leprea*, and its rainforest habitat are threatened by fires. Mount Wellington was earlier ravaged by fires in the summer of 1939-40 after which *N. leprea* was not seen in the area for four years. The first post-fire encounter involved but a single adult, however, by the next season (the summer of 1944-45) a small population had re-established (Couchman 1946). After the devastating bushfires of 1967 it was not seen again until January of 1987 (Prince 1988) - this time involving an absence of some 20 years! However, nearby at Myrtle Forest (aka Collins Cap), the butterfly seemingly reappeared, after about a decade, in January 1978 (Prince 1988; in Table 11 but compare text on p.31).

As well as the isolated rainforest pockets at Weldborough Pass in north-eastern Tasmania where the butterfly is absent, suitable *leprea* habitat exists in southern Victoria, but, no doubt, ancient bushfires extirpated any remnant *Nesoxeniea* populations (assuming generic representatives once occurred on the mainland). In addition, the late Tony Bishop (1972) observed rainforest on the slopes of Mount Strzelecki on Flinders Island in Bass Strait, and speculated the potential presence of the butterfly here also. The remarkable absence of the species in north-eastern Tasmania (Couchman & Couchman 1977, Morton 1988) suggests this is unlikely.

After reaching the tranquil rainforest glade at O'Grady's Falls (ca. 460m), I was relieved to see that the Leprea brown had also recolonised this locality. Mine is seemingly the first report since the 1967 fires, albeit, the species presumably re-established some years ago, perhaps soon after McQuillan's aforementioned observation at "700m" in Prince (1988) (an elevation coinciding with The Springs-Organ Pipes area).

At the falls, males were locally abundant, flying about the tips of *Pomaderris* and low juvenile foliage of Antarctic beach - about 3-4 metres above ground. I counted some six or seven males in half an hour, but no females were recognised with certainty. Some fresh adults perched on beech foliage with wings opened in a V-shape basking themselves in the midday sunshine. In so doing their cream coloring was clearly displayed. The emergence of this, sedge-feeding, sole representative of the genus *Nesoxeniea*, is very much seasonally controlled, usually reaching peak adult abundance about this time of year (mid January), but can be locally delayed by ensuring unsuitable weather. In some atypical years adults in good condition can be seen well into March (Prince 1988).

In 1956, the *leprea* population on Mount Wellington was designated by Couchman as the type locality of the nominate subspecies. It is recognised by the creamish rather than orange central colors above. Adults of this post-fire population conform fully with the nominate pattern and coloring and have evidently recolonised from surviving populations somewhere nearby. On the wing, their color gives an illusion of some non-descript, silver, black and whitish-yellow lycaenid, especially when fluttering high up in the canopy about the lateral tips of beech foliage.

Fortunately for the observer, adults also regularly descend to settle on low branches, where, at eye level or below, they seemingly take on the flight characteristics of a chimera of *Oreixenica* and *Argynnina*. When basking on low foliage, with wings half opened, their habits are indeed reminiscent of *Oreixenica*, however, their tendency to perch amongst the upper foliage of tall trees as well is characteristic of *Argynnina cyrilla*!

Planning to ascend the Central Plateau the same day, I reluctantly departed this delightful glade leaving the Leprea browns to their creek-side territories. Travelling via Hobart and Glenorchy, I stopped briefly for a late lunch at New Norfolk - an historic town, settled in 1808 and situated near sea level in the centre of the State's hop growing district. Although a male Common Brown (*Heteronympha merope 'salazar'*) and a Painted Lady (*Vanessa kershawi*) put in passing appearances, the Cabbage white seemed the dominant residential butterfly. It was similarly abundant in a number of Hobart suburbs and in several towns farther west along the Lyell Highway in the Derwent Valley.

At Black Bob's Rivulet (ca. 350m asl) I pulled over onto the road shoulder to examine a deceased Tasmanian Devil - the first of five fresh road-kills of this endemic, black bear-like, carnivorous, marsupial to be encountered before reaching Derwent Bridge on the Central Plateau. Later, a Parks and Wildlife Ranger at Lake St Clair reassured me concerning these road losses, stating that the devil population is quite healthy and, indeed, numbers are now probably higher than prior to the European pastoral uptake in the region. The rapacious devils are aggressive and raucously snarling beasts to say the least - aptly named!

A ten minute roadside stroll through heath-woodlands at Black Bob's Rivulet, revealed a small number of Fringed blues and a lone black and yellow agaristine moth. A seemingly larger lycaenid which looked intriguing settled nearby, but this proved to be a mating pair of *N. agricola*! The male, which was rather worn with finely chipped wings, was carrying the very fresh female in flight. It was already 3pm, and still planning to visit Butlers Gorge I did not have time to see how long the pair remained in copulation, so left them perched about a metre above ground on a *Leptospermum* sapling.

Fortunately, I arrived at Butlers Gorge by 4pm. The weather was still sunny and, typical of temperate summers, late afternoon conditions were quite hot and characterised by peak butterfly activity. The heathy dry open forests at circa 700m, neighbouring the dam and Lake King William I, appeared a suitable area to seek butterflies so I spent two hours searching for whatever I could find. Throughout this time *N. agricola* was abundant, flying about and settling on various low plants including *Oxylobium ellipticum* and *Pultanea* sp. (*?juniperna*) scattered in predominantly closed heathland below a powerline easement. In *Neolucia*, males often significantly outnumber females, and my random examination of eight Fringed blues produced a male:female ratio of 7:1. The sex ratio seems skewed on the mainland, too; a few years ago at Nathan (Queensland) I randomly sampled 18 adults, only one of which proved female. However, for a sibling species, *N. mathewi*, at Grahamstown Dam (NSW) a less offset ratio of about 3:1 was determined (n=29).

In open forest at Butlers Gorge five other butterfly species were active between 4 and 6pm, but all were less prolific than the Fringed blue. Apart from occasional Painted ladies and Cabbage whites, a couple of Shouldered browns (*Heteronympha penelope panope*) rocketed past and three Leprea browns were seen fluttering amongst low vegetation. At this locality *N. leprea* belonged to subspecies *elia* (easily recognised by the conspicuous orange band above), but adults seemed far less common in open forest habitat here than in rainforest or rainforest edges at subsequent localities.

A delightful surprise and, indeed, quite thrilling encounter, was that of the small endemic subspecies of the Macleay's Swallowtail, *Graphium macleayanus moggana*. Although adults were solitary they could be encountered with predictability at a large white flowering *Leptospermum* sp. (*?lanigerum*) growing in tall shrubland beyond the dam. Every half hour or so a passing adult would drop down momentarily to feed, frantically skipping from blossom to blossom, creating an impressive flickering green, white and black spectacle as its' proboscis quickly probed each flower nectary. In Tasmania *G. macleayanus*, like *N. leprea*, is usually confined to rainforests (Couchman 1956), but, evidently, adults of both species will wander into differing vegetation communities in search of nectar sources. Couchman (1965) placed the *G. macleayanus* population at nearby Lake St Clair as his subspecies *moggana*, so adults encountered here at Butlers Gorge are well within the typified-range of the subspecies and corresponded with his descriptions and illustrations, and indeed also with the more recent (1984) illustrations by Japanese taxonomist, Kikumaro Okano. As I was keen to determine more precisely the geographic limits of this interesting taxon I remained alert for adults hereafter.

At about 6:30pm I arrived in the hydro-electric, semi-ghost, town of Tarraleah (ca. 500m asl) - just in time to see a couple more Macleay's Swallowtails still swiftly patrolling territories above the powerline easement and water conduits which rise steeply from the valley below. Unfortunately, because of the turbulent updraughts, I could net neither of these adults for the purpose of determining their subspecies, but since Tarraleah lies within the range of *moggana* I imagine they would be this form. A single male Cabbage white was also still flying at this rather late hour!

In alpine woodland, near the Hotel at Derwent Bridge (ca. 720m asl), I disturbed a number of freshly emerged *H. penelope panope* males which flew low over tussock grasses (one or more *Poa* spp.) during the early morning sunshine. At 8:40am a few individuals fed at flowers of clover (*Trifolium* sp.) in between patrolling and territorial interactions. As well as being a common lowland species, *Geitoneura klugii* is often encountered, albeit somewhat sparingly, at high altitude in the southern Australian states. Here, too, a couple were flying and settling on leaf litter amongst dry grass in company with a swarm of lycaenids (*N. agricola*). Common and Waterhouse (1981) in 'Butterflies of Australia' record *G. klugii* to about 900m in Tasmania, but *N. agricola* occurs to an even higher altitude of 1065m.

In general, Australian alpine butterflies seem very habitat specific, and, in compliance with this, about 100 metres away in a nearby boggy sphagnum-button grass plain none of the above species was encountered. Instead, the dainty Bright-eyed brown (*H. cordace kurena*) and the Mountain blue (*Neolucia hobartensis*) were flying in small numbers over the low vegetation. Adults of the Bright-eyed brown varied from fresh to worn suggesting the middle of their ephemeral flight period, which according to Common and Waterhouse is confined to January. Button grass plain is the usual habitat of the alpine *kurena* form, whereas the other 'Tassie' forms, *legana* and *comptena*, are associated with nondescript montane swamps, and coastal plains and river estuaries, respectively (Couchman 1954).

Lake St Clair, discovered (by Europeans) in 1826, is over 200m deep and occupies a basin gouged out by two glaciers some 20,000 years ago. En route I passed a number of button grass plains which, undoubtedly, harboured more colonies of *H. cordace* and perhaps other browns too. The delightful weather was perfect for butterfly activity but time was a limiting factor. The picturesque Cynthia Bay (737m asl), at the southern end of the Lake, is where the Rangers' office and tourist centres are located, and it is from here that the 85-kilometre Overland Track though Cradle Valley commences. I didn't have time for an extended hike, but chose a short late morning stroll along the western shore which took me through *Nothofagus* forest pockets where, much to my delight, *N. leprea* was locally abundant.

Many *leprea* adults were flying high up about the beech trees, and from time to time some fluttered amongst ferns and low lying shrubs in sunny clearings. Here they perched with wings in a V-shape in filtered sunshine, often about a metre above ground. This behaviour afforded close inspection of several males, all of which were a creamy yellow above and, hence, seemed somewhat transitional to the nominate subspecies from near Mount Wellington rather than fully agreeing with the distinctly orange populations encountered to the south at Butlers Gorge and, later, farther west along the Lyell Highway near Mount Arrowsmith. Couchman (1948), however, studied a lengthy series from the Lake St Clair-Lake Marion region and concluded these population belong with *elia*.

In open heath-woodlands adjacent Cynthia Bay a couple of small skippers piqued my curiosity, but both disappeared from sight before I had a chance to recognise them. Here, the most obvious butterfly was *H. penelape panope* although less common than at Derwent Bridge. It seemed this satyrine was still emerging so I was probably encountering the first adults for the season. From time to time *G. macleayanus* was seen in frenzied flight overhead. These would be subspecies *moggana* according to Couchman's (1965) reasoning, but as I did not examine any I cannot confirm this - there are some genuine limitations to strictly orthodox 'butterfly watching' (even for experts!) in spite of the growing trend of popular North American opinion.

Just after my lunch, which the local Bennetts wallabies attempted to share with me, I departed the National Park and continued west to King William Saddle, a scenic point situated about 800m asl, on the Lyell Highway. Again, in a button grass plain, *H. cordace kurena* was active along with the occasional passing *G. macleayanus*. On the central plateau *kurena* ranges in altitude from above 610m up to 1030m, but is also known from 455m at Hampshire (Common & Waterhouse 1981). Neyland (1993) defines the alpine zone in Tasmania as regions above 400m so the taxon *kurena* is strictly alpine in its occurrence.

A short distance further west I passed near Mount Arrowsmith. In this region, a contrasting landscape feature is the dense thamnic rainforest dominated by tall myrtle (*Nothofagus cunninghamii*) with an understorey of leatherwood (*Prostanthera lasianthos*), sassafras (*Atherospermum moschatum*) and Tea-tree (*Leptospermum* spp.). Here, at about 900m, a small number of the orange-banded *N. leprea elia* were fluttering low down amongst leatherwoods along the forest margin, and occasionally some were recognised flying near the forest canopy amongst the fresh copper-colored myrtle foliage. In open areas, adjacent the road shoulder, an occasional male of *Hesperilla donnysa aurantia* was seen patrolling, and a succulent young sassafras plant regularly attracted ovipositing Macleay's swallowtails in early afternoon (about 2pm). I examined only one of the latter females and, in agreement with *moggana* she had semi-obscure subterminal spots on the hindwing above, but also possessed the forewing postmedian spot between veins M2-M3 i.e. 'spot near lower end of cell' which, in *moggana*, is described as obscure or absent. This population is *moggana* here too, however, as a generality, female butterflies show greater variation than males and, hence, in this species could be more prone to show such transitional or ambiguous variation.

This ovipositing adult corresponded closely to the *moggana* female illustrated (in color pl.1, fig.4) by Okano (1984), and the accompanying male (Fig.3 of same plate) matches those seen at Butlers Gorge. In addition, Okano illustrates (in B/W on plate 3) eight more Tasmanian adults (portraying the variation in the subspecies) and, in my assessment, at least seven of these agree with *moggana*. As the localities are not stated and the subspecies' distribution (as understood by Okano) is inaccurate, it is quite possible that the final adult (fig. 8 of plate 3) may have been taken some distance from the type locality and, hence, could be from a transitional or even nominate population. These specimens, presumably collected by Couchman, if from a single

population implicate that some adults can approach, in facies, nominate specimens from north-eastern Tasmania.

Further west is Surprise Valley Lookout, which grandly overlooks dense thamnic rainforest clothing the river valley below. Here, at 750-800m, a few more *N. l. elia* were fluttering about in mid afternoon sunshine, and others of this same color form were encountered more commonly lower down at circa 400m, in the Franklin-Gordon Wild Rivers National Park, especially at the Franklin River highway crossing. This majestic section of World Heritage Area is dominated by cool temperate rainforest which includes stands of 2000-year-old Huon pine, and other trees that trace their origins back to the super continent of Gondwana. *G. macleayanus* (undet. subsp.) was active in the canopy, but apart from these two species, no other butterflies were seen in the rainforest itself. However, in the reserve's car park near the river crossing one or more males of a trapezitine skipper, *Hesperilla donnysa*, had established territories about parked vehicles.

H. donnysa aurantia is an endemic Tasmanian subspecies named about 50 years ago by the then Australian butterfly scholar Gustavus Waterhouse of Sydney. Its appellation is derived from the conspicuous bright orange spot on each hindwing upperside. These are sometimes visible in flight giving visual distinctiveness to the live adults compared to the correspondingly dull mainland subspecies. The swift adults rarely settle, but continually patrol their territories, disturbed only by other flying insects or the movement of motor vehicles. In western Tasmania *H. donnysa* became a familiar sight in disturbed habitat along roadsides or car parks, and seemed most common in heathlands and alpine scrubs. Particularly favoured habitat occurs about the Frenchman's Cap parking bay where, in mid afternoon (4pm), I encountered several, along with an occasional *N. agricola*, co-sharing regrowth clinging to recent overburden; McQuillan (1994) states that the species likes to defend suitable sections of roadside habitat (see also comments in Dunn 1996).

Later in the afternoon (5pm), along the walking track through heathland to Donaghy's Hill lookout (500m asl), several males of *H. donnysa* were feeding with *G. macleayanus* at *Leptospermum* flowers and a fresh female of this skipper was also recognised as it rested on low vegetation. The lookout itself, shrouded by hill-topping *G. macleayanus* (but unlike those in Victoria was missing *Delias aganippe*), overlooks a steep rainforest clad valley of the snaking Collingwood River and offers an enchanting panorama within the Franklin-Gordon Wild Rivers National Park. In the distance towards the south-west I could see Frenchman's cap with its ice-like quartz peak gleaming in the sunshine.

Towards evening, on the still sunlit low shrubland plains surrounding Lake Burbury (ca. 300m asl) (near Queenstown), I was fortunate to find a few butterflies still active at 6:30pm. *Z. labradus* was locally abundant in the grassy picnic area and was accompanied by a very worn and tired-looking Painted lady; the latter species is usually active in late afternoon, often after many butterflies become quiescent. A solitary black and white agaristine moth (*Phalaenoides tristifica*) was also seen. I have often encountered this dainty species on the mainland, but this particularly bright adult, unlike most Victorian examples, possessed a large white median spot on the hindwing above. In addition, the hindwing upperside included two rows of four postmedian dots (one pair per vein). This could be early evidence of a tendency towards the evolution of a local island form in this species. Based on my verbal description of the hindwing pattern, Ted Edwards identified a similar looking specimen in the ANIC which was taken at Burnie.

To be continued as Part 2.

References

Bishop, A.D. 1972. Results of a butterfly-collecting trip to Flinders Island. *Victorian Ent.* **2**: 4-5

Common, I.F.B. & Waterhouse, D.F. 1981. *Butterflies of Australia* (Second Edition). Angus & Robertson, Sydney.

Couchman, L.E. 1946. Notes on the Lepidoptera-Rhopalocera of Tasmania. *Pap. Proc. R. Soc. Tasm.* **1945**: 49-53

Couchman, L.E. 1948. Notes on the Lepidoptera Rhopalocera of Tasmania. *Rec. Queen Vict. Mus.* **2**: 93-96

Couchman, L.E. 1954. Notes on some Tasmanian and Australian Lepidoptera-Rhopalocera with descriptions of new forms and subspecies. *Pap. Proc. R. Soc. Tasm.* **88**: 67-79

Couchman, L.E. 1956. A catalogue of the Tasmanian Lepidoptera-Rhopalocera. *Pap. Proc. R. Soc. Tasm.* **90**: 1-33

Couchman, L.E. 1965. Notes on some Tasmanian and Australian Lepidoptera-Rhopalocera. II. *Pap. Proc. R. Soc. Tasm.* 99: 81-85

Couchman, L.E. & Couchman, R. 1977. The butterflies of Tasmania. *Tasmanian Year Book* **11**: 66-96

Dunn, K.L. 1996. Book Review: "Butterflies of Tasmania". *Victorian Ent.* **26**: 25,28

Dunn, K.L. & Dunn, L.E. 1991. *Review of Australian Butterflies: distribution, life history and taxonomy*. Parts 1-4. Published by the authors.

McQuillan, P. 1994. *Butterflies of Tasmania*. Field Naturalist Club, Tasmania.

Morton, D.E.A. 1988. North-east Tasmania. *Victorian Ent.* **18**: 63

Neyland, M. 1993. The ecology and conservation management of the ptunarra brown butterfly *Oreixenica ptunarra* (Lepidoptera; Nymphalidae; Satyrinae) in Tasmania, Australia. *Pap. Proc. R. Soc. Tasm.* **127**: 43-48

Okano, K. 1984. On the butterflies of "*Graphium weiskei*"- group (Papilionidae): with description of a new species. *Tokurana* (*Acta Rhopalocerologica*) **8**: 1-20

Prince, B. 1988. *The habitat requirements and conservation of Tasmanian endemic butterflies*. A report to the Tasmanian Department of Lands, Parks and Wildlife.

CALL FOR NOMINATIONS:
J.C. 'ZOO' LE SOUËF MEMORIAL AWARD

Nominations for the 1998 award are now invited. Details of Background, nomination, etc. were published in the December 1992 issue of the *Victotian Entomologist*. Nominiations must reach the Council at the following address by 30 September 1998:

Entomological Society of Victoria
c/- 66 Wiltonvale Avenue
Hoppers Crossing, Vic. 3029

NOTICE OF ANNUAL GENERAL MEETING

Members of the Society are advised that the Annual General Meeting will be held at the La Trobe University, Carlton Campus, Room AG17, 625 Swanston Street Carlton, commencing at 8 p.m. on Friday 19 June 1998.

AGENDA

1. Approval of minutes of AGM held on 20 June 1997
2. Treasurer's Report
3. Editor's Report
4. Reports from Committees
5. Election of Council for 1998-99
6 Expression of interest for joining Committees
7. Presidential Address
8. General Business

Nominations for positions on the Council, in writing and signed by the proposer, seconder and nominee, must be in the hands of the President seven days prior to the Annual General Meeting. Nomination forms and Proxy forms may be obtained from the President. Nominations may also be accepted at the Annual General Meeting.

OFFICE BEARERS

CONTRIBUTIONS TO THE *VICTORIAN ENTOMOLOGIST*

The Society welcomes contributions of articles, papers or notes pertaining to any aspect of entomology for publication in this Bulletin. Contributions are not restricted to members but are invited from all who have an interest. Material submitted should be responsible and original. The Editor reserves the right to have articles refereed. Statements and opinions expressed are the responsibility of the respective authors and do not necessarily reflect the policies of the Society.

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Contributions may be typed on A4 paper or *preferably* sent to the Hon. editor on an IBM formatted disk in ***Microsoft Word for Windows, WordPerfect*** or any recognised word processor software with an enclosed hard copy. Contributions may also be E-mailed to Internet address: **dobrosak@.secv.telememo.au** or **dobrosak@werple.net.au** When E-mailing, indicate italicised or underlined text by including a suitable ASCII character (e.g.*) before and after the relevant text. Formatted documents e.g. Word for Windows may be E-mailed as "uuencoded" text.

The deadline for each issue is the third Friday of each odd month.

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DIARY OF COMING EVENTS

Friday 17 April General Meeting
Simon Hinkley of the Museum of Victoria will present a talk on:
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Environmental Indicators in the Box Ironbark Region"

Friday 15 May Council Meeting

Friday 19 June Annual Geueral Meeting
Presidential Address: "A Passion for Small Things - A History of Entomology"

Friday 17 July Council Meeting

Friday 21 August General Meeting
I. Endersby & A Farnworth will present a talk on "Insect Photography"

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